

Chapter 4 - The War of 1914-1918

Part II - The Manufacture of Munitions

In preceding chapters we have seen that there had been established the manufacture of Small Arms Ammunition, of the Cordite used as the explosive of that ammunition, and of the Rifle that was to use the ammunition: the Rifle, Short, Magazine Lee-Enfield, Mark III, with Bayonet and Scabbard; that there was a separate factory for each product, and that all the factories were in operation by 1911. For the couple of years following these factories continued operating steadily on a modest manufacturing programme designed to meet the needs of the rapidly developing Universal Citizen Training scheme. In addition, the first step had been taken for the production of Artillery Ammunition, Parliamentary approval had been obtained for extensions to the Government Cordite factory for manufacture of Gun Cordite; this probably was all that could have been expected out of the limited resources then available in Australia.

With the outbreak of war in August 1914 it became obvious that now there was a positive need for Artillery Ammunition, particularly of the type used in Quickfiring Guns; the standard British pattern of such guns being "Ordnance, G.F., 18-pounder". Some of these guns were already in Australia; they arrived about 1904, and I personally had the duty of entering the receipt in the ledger records at the Ordnance Stores branch.

In September 1914 the question was taken up seriously by the Chief of the General Staff, Colonel J.G. Legge; he discussed local production of shell

* steel with Dr Rosenhain with whom he arranged for an investigation of the resources of the Broken Hill Proprietary Company's new works at Newcastle, New South Wales, for making the steel, and of the Hoskin Steelworks at Lithgow, N.S.W., in rolling the bars. The Colonial Office was advised by cablegram of the Government's desire to manufacture Q.F., 18-pdr. guns and ammunition and asked to send out full details of manufacture and also if foremen fully understanding manufacture could be obtained from the trade.

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The reply set out the difficulties of assisting in the manner desired and stated that no foreman could be spared and suggested that a delegation should be sent to study the business and obtain the plant necessary. The response to this was a cablegram to the Official Representative in London stating that the delegation suggestion was impracticable and instructing that Messrs Coghill and Watts of the London Office should investigate, but Captain Collins replied that little progress could be made in such enquiries owing to the preoccupation of the British experts with war production. Colonel Legge minuted this -

It is strongly urged that the same crisis operates here, in view of the possible results of this war. I think neither time nor money nor energy should be spared in placing us in a position to make artillery ammunition within twelve months.

The Minister agreed and a cablegram was sent (21st November 1914) emphasising the instructions and that obstacles should be overcome. A letter also arrived from the War Office confirming its cabled advice and offering to supply component parts of 18-pdr. ammunition in various stages of manufacture together with drawings and specifications.

At this time I was stationed at the Small Arms Factory, Lithgow, and we became aware there of the enquiries being made in regard to manufacture of Q.F. Ammunition. Mr. F.R. Ratcliffe, the Assistant Manager, happened to be in possession of the plans for manufacture of the complete 75 mm Q.F. Ammunition which had been prepared by the Pratt and Whitney Company of U.S.A. for a tender for the Government of China. This ammunition was very similar to the British 18-pdr. Q.F. Ammunition, and the Secretary of the Defence Department was advised of its existence. With information prepared by Mr. Ratcliffe, I prepared a letter to the Secretary informing him that a complete plant to make a 200 Cartridges inclusive of Shrapnel Shell, Brass Cartridge Cases, and Fuzes in a day of eight hours would cost £83,175 (including power plant), and that the probable cost of 48,500 square feet floor space in buildings would be £15,000. A covering letter by Mr. A.C. Wright, the Manager of the Factory, on

behalf of the Pratt and Whitney Company (he was its former representative in Australia) said that the price covered the Tools and Gauges for the British Q.F. Ammunition. I was transferred to Melbourne shortly after despatch of this letter, and upon enquiry there it could not be found, I traced it ultimately to Colonel Legge and he recollected having received it but could not find it amongst his papers. It was found however - amongst the waste paper! It had been accidentally torn up and thrown out. The result was a cablegram to the London Office requesting that tender be invited from manufacturers, including Pratt and Whitney, to the same specification as Mr. Ratcliffe's but without the power plant, and it was further instructed that Captain Coghill should ascertain the plant necessary to make 18-pdr. guns.

In early 1915, the Chemical Adviser (Mr. Marcus Bell) supplied a detailed survey of the processes involved in the manufacture of the complete 18-pdr. Q.F. Cartridge and suggested obtaining gauges, provision of a proof range, appointment of a manager to organise production, etc., and this was considered by the Minister on 26th March 1916. The papers were endorsed with a direction that preliminary action should be taken by way of obtaining technical information, specifications, etc., but positive action as to a Manager, the proof range, ordering gauges, etc., was deferred. However the Minister did instruct the C.G.S. to confer with the Consulting Military Engineer (Colonel P.T. Owen, Director-General of Works) with regard to selection of a site for an Arsenal. I had the duty of preparing the memorandum and I took the liberty of elaborating it by adding the following -

In suggesting a site, consideration should be given to an area sufficient for plant for -

18 pr. Q.F.Guns with possible expansion to large guns.

18 pr. Q.F. Cartridges with possible expansion to other ammunition, and Artillery Carriages and Waggons.

A joint power plant covering Small Arms Factory requirements might receive consideration.

The significance of this is that it can be regarded as the initial step in the idea, on the part of the Minister, of an Arsenal to be located in the Australian Capital Territory, and that I was broadening it out into a General Arsenal.

There was nothing further of importance during the ensuing two months, but in June 1915, the Chief of Ordnance (Colonel H.W. Dangar) and the Chemical Adviser pointed out that as the War Office in England could not supply Fuzes, the whole matter would require further consideration especially as since the proposal originated, the High Explosive Shell had become a necessity (shrapnel shell only had been discussed up to this) and that would involve, in addition to the Shell, a different Fuze and the important matter of manufacture of the High Explosive: Trinitrotoluene, or as it is officially and popularly known: T.N.T. They pointed to the additional needs of technical staff and urged that provision of plant and machinery was secondary to technical and inspection staffs, and the arrangements for supply of the constituent materials.

An explanation of the difference between "high explosive" shell and "shrapnel" shell seems to be appropriate here. Until World War I, shrapnel shell was favoured for use against soldiers fighting in massed ranks such as battalions of infantry. The shrapnel shell has been in use in the British Army since 1802 and was important in the Battle of Waterloo. It was invented by Henry Shrapnel, a British soldier, who died in 1825 with the rank of Major-General. It is a thin-walled shell more or less filled with lead bullets of about $\frac{1}{4}$ -inch diameter and carries a gunpowder charge in the base which is fired by a brass fuze in the nose which is set to explode the gunpowder while the shell is in the air over the enemy troops. This causes the bullets to spray out over the enemy troops, so that, if the shell is well timed, the bullets will cover an area of approximately 30 yards wide and 300 yards long. Obviously it would be ineffective against a fortress or armour, or even troops crouching in trenches.

For the latter, a thick-walled shell must be used, and this is also effective against wire entanglements; it is filled with a violent explosive which, on being fired by a fuse, bursts the steel casing into fragments, and it is these which do the damage. A tendency has developed since the commencement of World War II to describe the fragments of High Explosive shell as "Shrapnel"; I understand that in the United States the High Explosive shell is itself designated "the Shrapnel shell", but that is incorrect, the real shrapnel shell is as I have described it. It is true that the United States Army can please itself as to the name it will apply to any given article, but I suggest that in justice to the inventor: Henry Shrapnel, his name should be given only to the shell he invented.

During July and August of 1915, detailed specifications of plant for 200 complete sets daily of the metal components, but not including the explosives, of 18-pdr. Q.F. ammunition, were received from Pratt and Whitney, together with the prices, and also a scheme for a similar output - prepared by the Dominion Arsenal in Quebec - was obtained by Mr. H.W. Gepp, who was travelling in Canada at the time, at the request of the Federal Munitions Committee. However, in view of decision that Mr. A.E. Leighton, Manager of the Cordite Factory, should visit England on a mission of enquiry, and subsequently that an Arsenal Committee should visit India for a similar purpose, further departmental action in that particular direction was left in abeyance for a while and will be brought up again in later chapters. This chapter therefore will be concerned only with the Munitions Administration during the War of 1914-1918.

GOVERNMENT FACTORIES - ADMINISTRATION

The factories being operated by the Department of Defence at the beginning of August 1914 were -

Clothing Factory, South Melbourne, Victoria.	Clothing, headgear.
Cordite Factory, Maribyrnong, Victoria.	Cordite, fulminate of mercury.
Harness Factory, Clifton Hill, Victoria.	Harness and Saddlery, accoutrements, canvas goods, leatherware.
Small Arms Factory, Lithgow, New South Wales.	Small arms, brass goods, pressed metal components.

In 1915 there was completed a -

Woollen Cloth Factory, North Geelong, Victoria.	Woollen Cloth.
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In 1918 there was completed an -

Acetate of Lime Factory, (subsidiary to the Cordite Factory) Bulimba, Queensland.	Acetate of Lime, alcohol.
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During the war the factories were greatly extended as can be gauged from the expenditure here recorded -

Factory	Book Value on 30th June, 1914	Book Value on 30th June, 1921 plus depreciation written off in 1914-1921	War Expenditure
	£	£	£
Acetate of Lime	-	143,372	143,372
Clothing	115,008	172,199	57,191
Cordite	143,093	498,519	355,426
Harness	37,154	46,518	9,364
Small Arms	332,897	729,146	396,249
Woollen Cloth	-	356,355	356,355
Totals	628,152	1,946,109	1,317,957

The amount written off for Depreciation during 1913-1921 was 348,041, and the book value of the assets on 30th June, 1921, was 1,598,068. The amount was distributed as follows -

Factory	Land	Buildings	Plant	Stock	Debts	Cash	Total
	£	£	£	£	£	£	£
Acetate of Lime	1,717	31,964	76,402	12,356	1,635	-	124,074
Clothing	1,981	10,781	8,529	90,105	47,715	179	159,290
Cordite	11,085	90,973	80,155	231,322	3,246	-	416,781
Harness	620	7,753	4,325	17,055	10,140	-	39,893
Small Arms	2,912	77,630	117,269	329,595	39,859	7,966	575,321
Woollen Cloth	(gift)	60,456	70,071	90,721	57,517	4,034	282,799
Total	18,315	279,557	356,751	771,154	160,113	12,179	1,598,068

m £4,000 invested in British Dyes Limited

The value of goods produced during the war in the Government factories, including by products, was as follows -

Factory	Commenced	1911-13	1913-14	1914-15	1915-16	1916-17	1917-18	1918-19	1919-20	1920-21
		£	£	£	£	£	£	£	£	£
Acetate of Lime	1918	-	-	-	-	-	-	25,598	27,193	50,923
Clothing	1911	165,398	164,714	234,587	269,440	243,865	347,656	331,859	168,662	152,670
Cordite	1911	33,914	42,360	44,858	83,950	73,677	91,849	82,200	63,165	43,490
Harness	1911	82,927	62,835	119,060	253,888	166,435	87,858	82,027	47,957	70,562
Small Arms	1911	4,825	70,863	172,956	328,312	339,070	298,252	391,182	324,854	296,640
Woollen Cloth	1915	45,053	149,780	145,275	174,019	177,252	270,202
Total	..	287,062	340,772	574,461	980,643	972,827	970,890	1,086,881	809,083	884,487

Thus the total war production (1914-1919) was nearly £5,000,000. In addition to providing a substantial part of the war requirements of stores, quantities of goods were manufactured for other Departments.

EMPLOYMENT

The demand for employees in the factories varied according to the requirements of the Expeditionary Forces, and it happened that the peak periods occurred at different dates. The following table gives some idea of the fluctuations :-

Factory	Number employed on 30th June of year stated			Wages distributed 1914-1921
	Male	Female	Total	
				£
Acetate of Lime				included with Cordite Factory
1914	-	-	-	
1919	47		47	
1921	57	-	57	
Clothing				347,187
1914	92	355	447	
1915	109	612	721	
1921	52	313	365	
Cordite				170,006
1914	97	-	97	
1918	199	-	199	
1921	115	-	115	
Harness				217,966
1914	144	31	175	
1916	344	102	446	
1921	66	14	80	
Small Arms				1,395,674
1914	382	-	382	
1918	1529	-	1529	
1921	836	-	836	
Woollen Cloth				170,610
1914	-	-	-	
1919	136	133	269	
1921	191	171	362	
			Total	2,301,443

The greatest number of employees was engaged during 1916, the figures for 30th June of that year being :-

Males .. 1,928

Females .. 799

Total .. 2,727

It should be noted that complementary with the foregoing Government Factories, there was a long-established Small Arms Ammunition Factory at Footscray, Victoria, owned by the Colonial Ammunition Company Limited of England, which also operated a sister factory in Auckland, New Zealand, making ammunition for the Government of New Zealand. As the Footscray factory was an essential part of the Australian Defence organisation, its operations to the extent that the Defence Department was concerned are recorded in this narrative. It was leased by the Commonwealth in 1921 and purchased outright in 1927.

Matters of general application in the administration of the Government Factories during the period 1914-1918 which should be placed permanently are -

Sanitary Inspection

During the epidemic of Cerebro-Spinal-Meningitis in 1915, several cases occurred at the Government Clothing Factory, questions were raised as to the cause and whether there should be any precautionary measures such as regular inspection of the sanitary arrangements. I submitted a Minute from which the following is extracted -

There is nothing to show the Clothing Factory was in itself responsible for the recent outbreak of cerebro-spinal-meningitis, and it is doubtful if any amount of sanitary inspection would have prevented the limited number of cases discovered.

It is suggested that Managers be advised of the desirability of regular sanitary inspection by medical practitioners and asked to arrange accordingly.

The Minister approved of this and in later years no doubt the departmental Medical staff would have taken over the inspectional duty.

Liability for Municipal Rates

In September 1918, the Shire of Braybrook claimed from the occupants payment of municipal rates upon the quarters they occupied adjoining the Cordite Factory although they were in fact the property of the Commonwealth of Australia. The Crown Solicitor expressed the opinion that as the quarters in question were a Commonwealth instrumentality they were not liable to be rated by the Council.

Treasury Finance in relation to Factories

In all the Government Factories, it had been the rule, according to Treasury instructions, that all receipts of moneys by the Factories, whether they be provided by the Treasury out of the Annual Appropriation Acts, or as the proceeds of sales of products, should be paid into a Trust Fund Account, and that all expenditures incurred by the factories should be met out of that Account. There was a proviso however that at the end of each Financial Year, the balance of cash remaining in the Trust Account should be paid into the Consolidated Revenue, the theory being that no agency of Government should be permitted to accumulate funds and retain them in its own control; that it be dependent always upon the Parliamentary Votes for its funds. Nevertheless, the principle was departed from during the war of 1914-1918, but only as a special case arising out of the exigent nature of the war production effort; a ready access to large amounts of funds was necessary and they had been accumulated and were standing in the Trust Account, and it was decided that no purpose was to be gained by paying them into the Treasury on 30th June 1917 and asking Parliament to vote them again as at 1st July 1917; it was considered that the principle could be waived for the time being and reinstated at the first indication that an inordinate accumulation was developing, or else on 30th June 1918; as did actually occur. The circumstance is recorded in case the necessity should arise again.